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Wei Gao

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WEI GAO, YOSHI ONO,
and JOHN F. CONLEY, JR.

Appeal 2008-2104
Application 10/813,789
Technology Center 1700

Decided: June 12, 2008

Before CHUNG K. PAK, CATHERINE Q. TIMM, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1-13 and 15-21. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse the rejections made by the Examiner. However, we enter a new ground of rejection for claims 1 and 21 based on our authority under

37 C.F.R. § 41.50(b) (2005). We leave to the Examiner to address dependent claims 2-13 and 15-20 in accordance with our determination.

I. BACKGROUND

The invention relates to a method for manufacturing a microlens or a microlens array. (Spec. 1). The method includes etching the lens shape into a transparent silicon oxide layer using a wet isotropic etch, yet still achieving sloped sidewalls by utilizing at least two different materials with different etch rates. (Spec. 4) Claims 1 and 21 are illustrative of the subject matter on appeal:

1. A method of forming a microlens structure comprising:
providing a transparent material;
forming a hard mask overlying the transparent material;
patterning an opening in the hard mask;
forming a lens shape by etching the hard mask and the transparent material using an isotropic wet etch that etches the hard mask faster than the transparent material, whereby the hard mask is etched laterally to expose a large area of the underlying transparent layer as the etch proceeds; and,
removing the hard mask.

21. A method for forming a microlens structure, the method comprising:
providing a transparent material;
forming a hard mask overlying the transparent material;
patterning an opening in the hard mask;
applying an isotropic wet etch;
etching the hard mask faster than the transparent material;
laterally etching the hard mask to expose an underlying area of the transparent material;
forming a lens shape in the transparent material; and,
removing the hard mask.

The Examiner relies on the following prior art references to show unpatentability:

Hawkins	US 6,211,916 B1	Apr. 3, 2001
Rhodes	US 6,307,243 B1	Oct. 23, 2001
Tsunetomo	US 2003/0157211 A1	Aug. 21, 2003
Yamamoto	US 2004/0082094 A1	Apr. 29, 2004
Ozawa	US 6,781,762 B2	Aug. 24, 2004

The Examiner made the following rejections:

1. Claims 1-11, 13, 17, 20, and 21 under 35 U.S.C. § 102(e) as anticipated by Ozawa;
2. Claim 12 under 35 U.S.C. § 103(a) as obvious over Ozawa in view of Hawkins et al. (“Hawkins”);
3. Claim 15 under 35 U.S.C. § 103(a) as obvious over Ozawa in view of Rhodes;
4. Claim 16 under 35 U.S.C. § 103(a) as obvious over Ozawa in view of Hawkins and Tsunetomo et al. (“Tsunetomo”); and
5. Claims 18 and 19 under 35 U.S.C. § 103(a) as obvious over Ozawa in view of Tsunetomo.

II. DISCUSSION

Appellants argue that layer 220’ as taught by Ozawa cannot be a hard mask as claimed because one of ordinary skill in the art would be aware that “a mask or hard mask is a temporary structure used in the process of selectively etching semiconductor regions,” that is always removed after the etching process is complete and layer 220’ remains present after the etching process. (App. Br. 5-6; Reply Br. 2). The Examiner’s broad interpretation

of the claims as reading on partially removing the hard mask is distinguishable from the claim language and “nowhere evident in the Applicant’s [sic, Applicants’] specification or drawings.” (App. Br. 6; Reply Br. 3). Appellants also argue that Ozawa teaches a hard mask 612, which does not include the claimed features of the invention. (App. Br. 5-7; Reply Br. 2).

The Examiner responds that “[t]he term ‘hard mask’ has received no special definition in Applicant’s [sic, Applicants’] disclosure to indicate that the term ‘hard mask’ must be interpreted [as] ‘a mask that is *always* removed after the etching process is complete.’” (Ans. 8). The Examiner also notes that, despite not being labeled as a “hard mask”, “layer 220’ of Ozawa performs the same function as Applicant’s [sic, Applicants’] disclosed hard mask.” (Ans. 8-9). The Examiner also argues that the claims do not recite that *all* of the hard mask layer is removed and that limitations from the Specification are not read into the claims. (Ans. 9).

Claim Construction

An issue on appeal arising from the contentions of Appellants and the Examiner is: did the Examiner reversibly err by construing the phrase “removing the hard mask” to encompass partially removing layer 220’ of Ozawa? We answer this question in the affirmative.

A preponderance of the evidence of record supports the following Findings of Facts (FF):

1. Appellants’ Specification indicates that “[a] hard mask 16 has been formed overlying the transparent layer 14.” (Spec. 2, ll. 25-26 and Figure 2).

2. Appellants' Specification also indicates that "[t]he hard mask 16 is consumed over time during the isotropic wet etch, both vertically and laterally." (Spec. 3, ll. 20-22).

3. Appellants' Specification notes that "when the hard mask 16 has been completely consumed during etching, the etch is stopped, as shown in Fig. 6." (Spec. 5, ll. 3-5 and Figure 6).

"[A]s an initial matter, the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

"[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005). "To begin with, the context in which a term is used in the asserted claim can be highly instructive." *Id.*

Applying the preceding legal principles to the Factual Findings in the record of this appeal, we determine that the phrase "removing the hard mask" in claims 1 and 21 requires removing the entire hard mask, not just some portion of the hard mask.

Independent claims 1 and 21 call for "removing *the* hard mask" (emphasis added). The use of the word "the" indicates that what is being removed is the hard mask previously referred to in the claims. Resort to the earlier portion of the claims reveals that the claims call for "forming a hard

mask overlying the transparent material.” Therefore, “the hard mask,” is the entire layer resulting from the forming step (i.e., the layer overlying the transparent material), and “removing the hard mask” requires removing the entire mask, not just some portion of the mask. Our interpretation is consistent with Appellants’ Specification that calls for the hard mask to be “formed overlying the transparent layer 14” and “completely consumed” by the etching process. (FF 1-3).

Anticipation

Another issue arising from the contentions of Appellants and the Examiner is: did the Examiner reversibly err in finding that claim 1 is anticipated by Ozawa? We answer this question in the affirmative.

A preponderance of the evidence of record supports the additional following Finding of Fact (FF):

4. Ozawa teaches that upon etching first film 220’, “a first film 220 is left in the vicinity of the edge of each microlens 500, as well as on the upper surface of that region of the transparent plate member 210 in which the microlens 500 is not formed.” (Ozawa, col. 7, ll. 29-32; col. 15, ll. 3-28; and Figures 2-3, 5 and 12(f)).

“To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

Applying the preceding legal principle to the Factual Findings in the record of this appeal, we determine that Ozawa does not anticipate claims 1 and 21.

Layer 220' of Ozawa, which the Examiner identifies as corresponding to a hard mask, is not removed during the microlens manufacturing process, but rather, only a portion of layer 220' is removed. (FF 4). Thus, we cannot sustain the Examiner's rejection of claims 1-11, 13, 17, 20, and 21 as being anticipated by Ozawa.

The Examiner maintains further rejections of claims 12, 15, 16, 18, and 19 under 35 U.S.C. § 103(a). Each of these rejections relies upon Ozawa in the same capacity as in the anticipation rejection. Moreover, the Examiner does not rely upon the additional prior art cited in the rejections in a way that remedies the deficiency discussed above. Therefore, we cannot sustain any of the rejections.

New ground of rejection

Because we find that Tsunetomo teaches each and every feature of claims 1 and 21, we make the following new ground of rejection.

Claims 1 and 21 are rejected under 35 U.S.C. § 102(e) as anticipated by Tsunetomo.

Tsunetomo teaches a method of forming a microlens structure (a method of making an aspherical lens or lens array). (Tsunetomo, ¶ [0043]). In accordance with the first step of claim 1, we find Tsunetomo provides a transparent material (additive-free transparent SiO₂ material layer 26). (Tsunetomo, ¶¶ [0071] and [0078]). Tsunetomo also teaches forming a hard mask overlying the transparent material of the second step of claim 1 (providing a fluoridated SiO₂ layer 28 overlying the transparent SiO₂ layer 26). (Tsunetomo, ¶ [0071] and Figure 8A). Tsunetomo also teaches patterning an opening in the hard mask (adding a Cr-mask over the

fluoridated SiO₂ layer 28 and etching the fluoridated SiO₂ layer 28 via the Cr-mask). (Tsunetomo, ¶ [0072] and Figure 8D). In accordance with the claimed forming step of claim 1, the etching is an isotropic wet etching (using aqueous hydrofluoric acid to etch isotropically). (Tsunetomo, ¶¶ [0046], [0072] and [0091] and Figures 8C and 8D).

As required by claim 1, Tsunetomo teaches that the hard mask etches faster than the transparent material (the fluoridated SiO₂ layer 28 etches faster than the additive-free SiO₂ layer 26). (Tsunetomo, ¶¶ [0047] and [0048] and Figure 1). As further required by the forming step, Tsunetomo also teaches that the hard mask is etched laterally to expose a larger area of the underlying transparent layer as the etch proceeds (i.e., the fluoridated SiO₂ layer 28 is etched laterally exposing a larger area of the additive-free SiO₂ layer 26 as the etch proceeds). (Tsunetomo, Figures 8C and 8D). Finally, as required by the removing step of claim 1, Tsunetomo teaches removing the hard mask (i.e., the fluoridated SiO₂ layer 28 is etched away, thus completely removing the fluoridated SiO₂ layer 28). (Tsunetomo, ¶ [0072] and Figure 8E)

We find Tsunetomo teaches each and every limitation of claim 1. Since claim 21 features nearly identical limitations as claim 1, we find claim 21 is also anticipated by Tsunetomo according to the same analysis.

A preponderance of the evidence supports a finding of anticipation of claims 1 and 21 since Tsunetomo teaches each and every limitation of claims 1 and 21. We leave the Examiner to address dependent claims 2-13 and 15-20 in accordance with this new ground of rejection.

III. CONCLUSION

Based on the factual findings set forth above, we reverse the Examiner's decision rejecting claims 1-13 and 15-21. However, we enter a new ground of rejection of claims 1 and 21 under 35 U.S.C. § 102(e) as anticipated by Tsunetomo, pursuant to our authority under 37 C.F.R. § 41.50(b).

IV. DECISION

We reverse the decision of the Examiner, but enter a new rejection.

V. PROCEDURAL MATTERS

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). This regulation provides that "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review."

37 C.F.R. § 41.50(b) also provides that the Appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution*. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner....

(2) *Request rehearing*. Request that the proceeding be reheard under § 41.52 by the Board upon the same record....

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

Appeal 2008-2104
Application 10/813,789

REVERSED

37 C.F.R § 41.50(b)

PL initial:
sld

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